Fall prevention among adult surgical patients in Tabriz, Iran: a best practice implementation project

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ABSTRACT

Introduction: Falling out of bed is the most common unintentional cause of injury among patients and is a major safety problem in health care facilities. Current practices for fall prevention may not always be aligned with established best practices, leading to variability in patient outcomes. This uncertainty underscores the need to assess and improve compliance with best practice guidelines for fall prevention.

Objectives: This project aimed to improve fall prevention in the surgical ward of a general hospital in Tabriz, Iran.

Methods: This study was guided by the JBI Evidence Implementation Framework. A baseline audit was conducted using eleven audit criteria representing best practices for fall prevention. After the implementation of improvement strategies, a follow-up audit was conducted to evaluate changes in practice.

Results: The results revealed significant improvements, notably, fall risk assessment upon admission (87% to 92%), fall risk assessment upon ward transfer (39% to 79%), patient participation in fall risk assessment (26% to 68%), reassessment upon change in condition (53% to 74%), communicating fall prevention information to at-risk patients and their families/caregivers (42% to 63%), engagement of patients (100% to 100%), implementation of targeted strategies (89% to 92%), post-fall assessment and interventions (82% to 87%), revising patient fall risk status and reviewing care management plan (41% to 74%), fall prevention information to patients and their families/caregivers upon discharge (44% to 66%), and person-centered education of health care professionals (77% to 81%).

Conclusion: The use of standard clinical audit tools in hospitals can improve the quality of patient care and increase the effectiveness of interventions by identifying weaknesses in the patient care process.

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Keywords: best practice; clinical audit; evidence-based practice; fall prevention

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What is known about this topic?

- Falling out of bed can lead to injuries, increased length of hospital stay, reduced quality of life, and can leave patients with emotional distress and fear of falling again.
- Over 80% of fall-related fatalities occur in low- and middle-income countries, within regions of the Western Pacific and Southeast Asia.
- A clinical audit is a useful tool for improving fall prevention.

What does this paper add?

- Clinical audit can be used to improve performance. This method is effective in analyzing and examining the current situation and implementing appropriate interventions to resolve issues.
- Interventions such as workshops or conferences can facilitate the implementation of evidence into clinical practice.
- Health policymakers and top-level health care managers can use these results to implement the suggested interventions in other settings to improve fall prevention in hospitals.

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INTRODUCTION

Falling out of bed is a major public health problem. A patient fall is defined as coming to rest inadvertently on the floor with or without injury to the patient. A fall may result in fractures, lacerations, or internal bleeding, leading to increased health care utilization. Each year, somewhere between 700,000

and 1 million patients in the United States fall out of bed in hospitals.[1] An estimated 646,000 fatal falls occur each year, making it the second leading cause of unintentional injury and death, after road traffic injuries.[2] Over 80% of fall-related fatalities occur in low- and middle-income countries, with regions of the Western Pacific and Southeast Asia accounting for 60% of these deaths. Rates vary widely across hospitals globally, and typically range from 3 to 11 falls per 1,000 bed days.[3] This rate is higher in developing countries than in developed countries. Accurate information in this regard is not available due to weakness in hospital information structures and lack of transparent processes in developing countries such as Iran.[4]

Although not fatal, approximately 37.3 million falls, severe enough to require medical attention, occur each year. Globally, such falls are responsible for over 17 million disability-adjusted life years lost. The largest morbidity occurs in people aged 65 years or older, young adults aged 15–29 years, and children aged 15 years or younger.[5]

The financial costs from fall-related injuries are substantial. For people aged 65 years or older, the average health system cost per fall injury in Finland and Australia was US$ 3,611 and A$ 1,049, respectively. Evidence from Canada suggests that the implementation of effective prevention strategies, with a subsequent 25% reduction in the incidence of falls among children under 10 years of age, could create a net savings of over US$ 120 million each year.[6]

Falls can lead to injuries, increased length of hospital stay, reduced quality of life, and can leave patients with emotional distress and fear of falling again.[5] A 10-year cohort study assessed the risk and burden of hospital falls and fall-related fractures using data collected from public hospitals in Victoria, Australia. The dataset included more than three million discharge episodes, with 0.64% of these recorded with an in-hospital fall. Of those falls, 17.6% were associated with a fracture, 44.4% of which were hip fractures. The proportion of in-hospital falls increased with age, with 79% of falls occurring in patients over 70 years of age. Younger patients also experienced falls, with patients aged 18–39 years accounting for 3.2% of falls and >11% of falls occurred in patients under the age of 60. In-hospital falls were shown to be associated with increased mortality (hazard ratio 1.3, 95% confidence interval [CI] 1.3 to 1.5) and length of hospital stay (median 19 days vs. 5 days, $p < 0.0001$).[7]

Most current literature recommends a comprehensive and multifactorial approach to fall prevention, involving the use of risk assessment tools and targeted interventions.[8] Fall prevention strategies should be comprehensive and multifaceted. These strategies should prioritize research and public health initiatives to further define the burden, explore variable risk factors, and adopt effective prevention actions.[9] They should support policies that create safer environments and reduce risk factors. The strategies should also promote engineering to remove the potential risks for falls, the training of health care providers on evidence-based prevention strategies, and the education of individuals and communities to create risk awareness.[10]

Clinical audit is an established method to identify areas of current practice that require changes to improve the quality of care. It seeks to compare current clinical practice against agreed standards of predetermined best practice.[11] This study conducted a clinical audit to assess fall prevention measures in a general hospital in East Azerbaijan, Iran. Furthermore, to promote best practice in fall prevention, this project sought to identify barriers to implementing best practice and assess the effects of developed strategies.

AIMS AND OBJECTIVES

This project aimed to improve fall prevention in the surgical ward of a general hospital in Tabriz, Iran using evidence-based criteria. The specific objectives were to:

- determine current compliance with evidence-based criteria regarding fall prevention;
- identify barriers to compliance and develop strategies to address areas of non-compliance;
- evaluate changes in compliance with the evidence-based practices following the implementation of improvement strategies.

METHODS

This evidence implementation project used the JBI Evidence Implementation Framework.[12] The JBI implementation method is grounded in an audit and feedback process, along with a structured approach to the identification and management of barriers to compliance with recommended practices. It consists of seven stages: (1) identification of practice area for change, (2) engagement of change agents, (3)

assessment of context and readiness to change, (4) review of practice against evidence-based audit criteria, (5) implementation of changes to practice, (6) reassessment of practice using a follow-up audit, and (7) consideration of the sustainability of practice changes. This project also used the JBI Practical Application of Clinical Evidence System (PACES) and the Getting Research into Practice (GRiP) audit and feedback tool.[12] For practical purposes and ease of understanding, the seven stages of the JBI Evidence Implementation Framework[26] were grouped into three broader phases:

1. **Planning phase**: This phase included stages 1, 2, and 3, focusing on identifying the practice area for change, engaging change agents, and assessing the context and readiness to change.
2. **Implementation phase:** This phase encompassed stages 4 and 5, which involved reviewing practice against evidence-based criteria and implementing changes.
3. **Post-implementation phase:** This phase covered stages 6 and 7, focusing on the re-assessment of practice and consideration of sustainability.

Setting

This project was conducted in the surgical ward of a general hospital in Tabriz, Iran with a total of 220 beds, 365 nurses, and an occupancy rate of 88%. The ward itself had twelve beds. In 2020, the average length of stay in this ward was 1.38 days. The average age of patients was 45 years. This hospital was selected for four reasons: (1) to implement all patient safety standards in the hospital, (2) to obtain the national hospital accreditation certificate, (3) to improve the commitment of senior managers at all levels of the hospital, and (4) to increase motivation among staff in all diagnostic, treatment, and support departments to improve the safety and quality of services delivered to patients.

Phase 1: Planning

The audit team consisted of twelve members including three physicians, five nurses, two PhD students in health care management, the quality control expert of the general hospital, and a research staff member. The audit criteria were derived from the best available evidence, that is, a JBI Evidence Summary entitled Falls in the Hospital Setting: Person-Centered Approach to Prevention.[13] Table 1 shows the audit criteria used in this project (baseline and follow-up audits) as well as a description of the sample and approaches to measure compliance with best practices for each audit criterion.

The criteria were translated into Persian by two of the researchers. Two English language experts were consulted to ensure the accuracy of the translations. A meeting was held to brief the members on the project and to discuss the audit criteria and data collection methods. The baseline audit was conducted in March 2020.

Of the eleven questions in this checklist, eight questions related to nurses, while three related to patients. All of the 38 nurses who provided services in three shifts in the surgical ward were involved in the study to answer criteria 1 through 8. Of the 1,140 patients who were admitted to the ward over the last 6 months, 228 (20%) were selected randomly to answer criteria 9 to 11.

To increase the level of participation of study participants, including staff and patients, we used methods such as face-to-face training on study objectives with patients in simple and understandable language, treating patients and their companions with respect, and monitoring the performance of nurses in the surgical wards. To increase employee participation through methods such as revising the payment system to service providers based on patient safety indicators, increasing employee motivation, monitoring employee performance continuously, handling patient complaints actively, and holding an annual celebration to appreciate the department were the leaders' activities to promote patient safety.

Phase 2: Implementation

The 4-month implementation period took place from April to August, 2020. The results of the baseline audit were analyzed to identify any gaps between current practices and best practices. The project team categorized the items for excellent performance (greater than 75%), moderate performance (50%–75%), and poor performance (less than 50%). We used the JBI GRiP tool to identify barriers to practice, suggest strategies for improvement, allocate resources, and establish expected outcomes in a 2-hour brainstorming session. The GRiP report was discussed in face-to-face meetings, and opinions of key stakeholders were gathered. Stakeholders were informed about the

Table 1: Audit criteria, sample, and approach to measure compliance with best practices

Audit criterion	Sample	Method used to measure compliance with best practices
1. Fall risk assessment is conducted upon admission.	Baseline: 38 nurses Follow up: 38 nurses	Use an admission risk assessment checklist and patient medical record.
2. Fall risk assessment is conducted upon ward transfer.	Baseline: 38 nurses Follow up: 38 nurses	Use an admission risk assessment checklist and patient medical record.
3. Patients participate in the fall risk assessment.	Baseline: 38 nurses Follow up: 38 nurses	Interview with patient.
4. Reassessment occurs when there is a change in the condition of the patient.	Baseline: 38 nurses Follow up: 38 nurses	Checklist and patient medical record Supervision of the head nurse.
5. At-risk patients and their families or caregivers receive oral and written instructions about fall prevention.	Baseline: 38 nurses Follow up: 38 nurses	Interview with patient. Patient medical record. Use an education assessment checklist.
6. Patients engage in goal-setting and treatment planning.	Baseline: 38 nurses Follow up: 38 nurses	Interview with patient. Use an engagement assessment checklist. Supervision of the head nurse.
7. Targeted strategies, including relevant multidisciplinary interventions, are implemented according to individual risk factors.	Baseline: 38 nurses Follow up: 38 nurses	Develop an operational plan and conduct monitoring. Interview with partners.
8. Post-fall assessment and interventions are implemented (if patient falls).	Baseline: 38 nurses Follow up: 38 nurses	Perform RCA and identify weaknesses. Use an assessment checklist. Supervision of the head nurse
9. Patient fall risk status is revised and care management plan is reviewed (if patient falls).	Baseline: 228 patients Follow up: 228 patients	Use a care management checklist Interview with the patient Supervision of the head nurse.
10. Patients and their families or caregivers receive instructions on discharge day and referrals are given for support services (where appropriate).	Baseline: 228 patients Follow up: 228 patients	Use a discharge information checklist. Interview with patient. Supervision of the head nurse.
11. Health care professionals are trained on person-centered fall assessment, prevention, and management.	Baseline: 228 patients Follow up: 228 patients	Use a patient education checklist. Interview with the patient. Supervision of the head nurse. Use a patient education checklist. Use a risk assessment.

results of the audit and any other details about the process through ongoing communication.

Phase 3: Post-implementation

A follow-up audit was conducted in August 2020 using the same audit criteria and methods as the baseline audit to evaluate changes in nurses' compliance.

RESULTS

Baseline audit

Compliance rates for the eleven audit criteria were as follows: admission assessment (87%), fall risk assessment upon ward transfer (39%), patients' participation in fall risk assessment (26%), re-assessment upon change in condition (53%), sharing fall prevention information (42%), engagement of patients (100%), implementation of targeted strategies (89%), post-fall assessment and interventions (82%), revising patient fall risk status (41%), giving instructions upon discharge (44%), and person-centered education of health care professionals (77%).

Strategies for Getting Research into Practice (GRiP)

During the project, several barriers to compliance with best practices were identified (see Table 2).

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Table 2: Getting Research into Practice (GRiP) analysis

Barrier	Strategy	Resources	Outcomes
1. Lack of a mechanism for fall risk assessment during ward transfer.	• Delivering educational sessions. • Developing a procedure for care and follow-up by the hospital educational supervisor. • Weekly training with stakeholders in wards. • Developing policy and procedure for assessing fall risk upon ward transfer. • Assessment and control of medical equipment.	• Educational package • Extra staff • Policy and procedure • Checklist of assessment	Improved assessment of fall risk upon ward transfer.
2. Lack of training on re-assessment when the patient's condition has changed.	• Development of reassessment policy and procedure by the nursing office. • Training sessions. • Implementing continuous assessment and control by head nurses.	• Policy and procedure • Extra staff • Re-assessment tool	Improved re-assessment process (when condition is changed).
3. Lack of mechanisms for raising awareness of patients and companions about fall risk.	• Providing oral instructions and pamphlets to patients in the form of in-service training during hospitalization. • Printing and distributing brochures on preventing patients' bed fall. • Playing educational videos on to the prevention of patient bed falls, with subtitles in simple language in the patients' rooms. • Consideration of a section entitled "Prevention of falling out of bed" in the patient admission booklet entitled "Patient familiarity with the hospital."	• Face-to-face education • Printing and distributing educational brochures • Educational videos • Booklet entitled "Patient familiarity with the hospital"	Improved standard of oral or written instructions to at-risk patients.
4. Weakness in using multidisciplinary approaches to develop targeted strategies.	• Investigation of patients' bedside and conducting any necessary repairs. • Equipping all ward restrooms with patient safety handles. • Conducting an educational workshop for physicians on physical and chemical inhibitors. • Accurate recording of patients' falls in the ward and reporting to the quality improvement office. • Training ward assistants on moving patients from the bed. • Continuous monitoring and feedback. • Establishing a social media group with the aim of learning and sharing experiences.	• Financial resources • Training workshops • Face-to-face training • New instructions • Establishing a social group	Multidisciplinary interventions related to individual risk factors implemented.

Table 2: (*Continued*)

Barrier	Strategy	Resources	Outcomes
5. Lack of strategy to ensure patients' participation in the fall risk assessment.	• Providing training to patients upon arrival in simple and understandable language. • Completion of fall risk assessment form by the patient and nurse. • Playing an educational video on fall risk assessment in the ward.	• Training courses • Fall risk assessment forms • Training videos	Improved patient participation in the fall risk assessment.
6. Lack of patient-oriented attitude in goal-setting and treatment planning.	• Developing a policy and procedure for patient participation in treatment planning. • Training workshop for nurses. • Continuous control by the head nurse about policy and procedure. • Training sessions for ward physicians.	• Workshop • Formal instruction • Training programs	Improved patient participation in goal-setting and treatment planning.

The first barrier we encountered was the lack of consistent fall risk assessments. This was reflected in baseline compliance of 39% for fall risk assessment upon ward transfer and 53% for re-assessment upon change in patient's condition. The primary issue was inconsistent procedures and a lack of awareness among staff about the importance of these assessments during ward transfer and condition changes. To address this, we implemented standardized protocols for fall risk assessments, conducted training sessions for staff to emphasize their importance, and introduced checklists to ensure compliance. These efforts were supported by training materials, checklists, and additional staff to monitor compliance, leading to improved follow-up compliance of 79% for fall risk assessment upon ward transfer and 74% for re-assessment in changed condition.

Another significant barrier was limited patient engagement in the fall risk assessment process, with baseline compliance at only 26%. This was primarily due to a lack of effective communication strategies to involve patients in their own risk assessment. We tackled this barrier by developing and disseminating patient-centered educational materials, training staff on communication techniques to engage patients, and holding regular meetings to discuss patient engagement strategies. These initiatives used resources such as brochures, training programs, and feedback, resulting in patient participation increasing to 68% in the follow-up audit.

We also faced challenges in information-sharing about fall prevention, which had a baseline compliance of 42% for sharing fall prevention information and 100% for patient engagement. This barrier was the lack of a systematic approach to information dissemination and an over-reliance on verbal communication. To address this, we implemented written protocols for information-sharing, utilized visual aids and pamphlets, and reinforced the importance of consistent information-sharing through staff meetings. These efforts involved resources such as visual aids, pamphlets, and staff training sessions, improving compliance to 63% for sharing fall prevention information while maintaining 100% engagement of patients.

Additionally, there were gaps in post-fall assessment and interventions, with a baseline compliance of 82%. This issue arose from inconsistent follow-up procedures after falls and a lack of standardized intervention protocols. We responded by developing standardized post-fall assessment forms, conducting training sessions on immediate and long-term interventions, and performing regular audits to ensure adherence. Resources for these efforts included post-fall assessment forms, training sessions, and audit tools, increasing compliance to 87% in the follow-up audit.

Lastly, we identified inadequacies in discharge instructions, with a baseline compliance of 44%. This barrier was due to inconsistent discharge planning

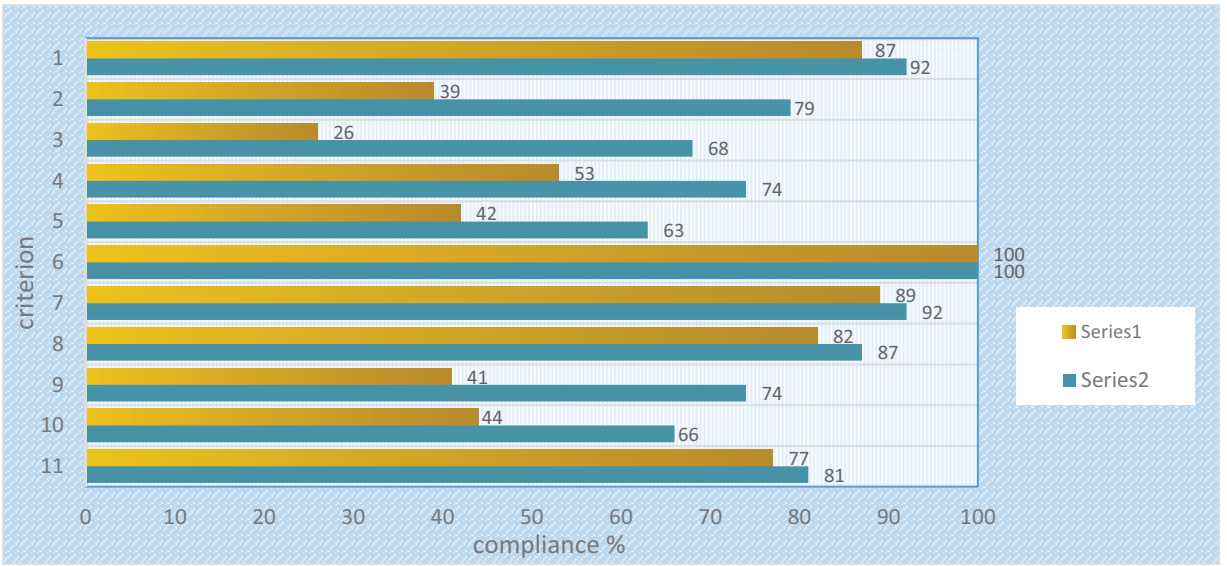
and a lack of standardized discharge instructions. To overcome this, we created discharge instruction templates, conducted training on effective discharge planning, and regularly reviewed discharge procedures. These initiatives required discharge instruction templates, training materials, and monitoring systems, leading to improved compliance of 66% in the follow-up audit.

Re-assessment of practice (follow-up audit)

Figure 1 presents the follow-up audit results compared with the baseline results. Significant improvements were observed, as follows: admission assessment (92%), fall risk assessment upon ward transfer (79%), patients' participation in fall risk assessment (68%), re-assessment upon changes in condition (74%), sharing fall prevention information (63%), engagement of patients (100%), implementation of targeted strategies (92%), post-fall assessment and interventions (87%), revising patient fall risk status (74%), giving instructions upon discharge (66%), and person-centered education of health care professionals (81%).

Sustainability considerations

Plans for sustaining the improvements included regular training sessions, periodic audits, continuous monitoring of compliance with the fall prevention strategies, and ongoing feedback to staff.



Audit criteria

1. Fall risk assessment is conducted upon admission.
2. Fall risk assessment is conducted upon ward transfer.
3. Patients participate in the fall risk assessment.
4. Re-assessment occurs when there is a change in the condition of the patient.
5. At-risk patients and their families or caregivers receive oral and written instructions about fall prevention.
6. Patients engage in goal-setting and treatment planning.
7. Targeted strategies, including relevant multidisciplinary interventions, are implemented according to individual risk factors.
8. Post-fall assessment and interventions are implemented (if patient falls).
9. Patient fall risk status is revised and care management plan is reviewed (if patient falls).
10. Patients and their families or caregivers receive instructions on discharge day and referrals are given for support services (where appropriate).
11. Health care professionals are trained on person-centered fall assessment, prevention, and management

Figure 1: Compliance with best practice audit criteria in the baseline and follow-up audits (%).

DISCUSSION

This project aimed to improve compliance with best practice criteria for fall prevention in the surgical ward of a general hospital in Tabriz, Iran. The study was conducted over a 4-month period and used the JBI Evidence Implementation Framework. The sample included 38 nurses and 228 patients. The results showed significant improvements in the follow-up audit compared with baseline, such as an increase in admission assessment compliance from 87% to 92% and fall risk assessment during ward transfer from 39% to 79%. Thus, the follow-up audit revealed improvements in six out of eleven criteria.

In this study, the rate of patient falls averaged 0.85% from 2019 to 2020. However, the proportion of falls associated with injury is far higher in Asian countries than overseas. The reason may lie in the culture of reporting in Asia. Many bed falls are unreported by patients and relatives when there is no associated injury, as the fall is deemed to have been uneventful.[14] The results of this study were similar to those of other studies on this subject.[15].

The overall achievement of this project was a reduction in falling out of bed in inpatient wards. However, other achievements included increased fall risk assessment upon ward transfer, increased patient participation in the fall risk assessment, and more instructions to patients and their families upon discharge. The results of this study were similar to other evidence examined.[16,17]

Numerous international studies conducted in the USA, the UK, and Australia have reported rates of falls in hospitalized patients as between 2 and 12 per 1,000 patient bed days. Moreover, fall-associated injury rates have been reported as between 5% and 10% in the USA, the UK, and Australia.[18,19] In a recent large-scale Taiwanese study involving patients, Chen *et al.* also pointed out that the domestic occurrence rate of patient falls averaged 0.03%, which is far lower than the average reported internationally (0.25%).[20]

The project's success was closely linked to the specific resources utilized for each strategy. For instance, the improvement in fall risk assessment upon ward transfer (Criterion 2) was achieved through the implementation of comprehensive training sessions for nursing staff and the development of standardized assessment tools. Similarly, the increase in patient participation in the fall risk assessment (Criterion 3) was facilitated by educational workshops and the distribution of informative booklets.

Not all strategies were equally effective. For example, initial attempts to increase awareness among patients and their families about fall risks through oral instructions proved less effective due to varying education levels. This led to the introduction of written materials and visual aids, which were more successful. Reporting these findings is crucial as they provide insights into which approaches may or may not work in different contexts.

Key lessons from this project include the importance of engaging stakeholders early, tailoring interventions to the local context, and maintaining flexibility to adapt strategies as needed. Continuous monitoring and iterative adjustments were crucial for achieving sustained improvements. The findings of this study align with prior research conducted in different regions. For example, Stephenson *et al.*[21] found that clinical audit and feedback promoted quality improvement in fall prevention practices in acute hospital settings. Similarly, Lee *et al.*[22] demonstrated the importance of caregiver awareness in reducing fall incidents in pediatric wards. These studies, along with our findings, highlight the universal applicability of structured audit and feedback in improving patient safety. Morris *et al.* (2017),[23] in their study entitled "Prevention of Falls in Hospital", concluded that yet falls are not accidents and there is evidence that a coordinated multidisciplinary clinical team approach can reduce their incidence. Identification of multiple underlying risk factors coupled with clear interventions to ameliorate the impact of each has been shown to reduce the incidence of inpatient falls by 20–30%. The implementation of complex multi-professional interventions is challenging, and successful schemes seek to nurture a culture of vigilant safety consciousness among all staff at the clinical interface. Strong leadership and organizational oversight can help to combine this cultural evolution with relevant evidence and rigorous measurement of performance to improve patient safety.

The project demonstrated that the implementation of evidence-based strategies could effectively enhance fall prevention practices. The utility of the project lies in its systematic approach to identifying and addressing gaps in practice, thereby improving patient safety and care quality. The practical change strategies, including targeted education sessions and enhanced communication protocols, had a substantial

impact on compliance with best practice recommendations.

To sustain the improvements made, future strategies should include the establishment of regular training programs, ongoing audits, and the integration of fall prevention protocols into standard hospital procedures. Additionally, plans to expand this project to other wards and hospitals will be crucial for broader impact.

CONCLUSION

Clinical audit can be used as a suitable tool to improve performance. This tool will be very effective in analyzing and examining the current situation and then performing appropriate intervention to that situation in order to resolve issues and problems. Further audits will need to be carried out to monitor practice and affect change as required. Health policymakers and top health care managers might use these results to implement and adhere to the suggested interventions in other settings to improve fall prevention in hospitals.

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